Chapter 18. Rectilinear Figures

Ex 18.1

Answer 1.

(i) When n = 7

$\therefore$ Sum of interior angles = $(n-2) \times 180°$

$= (7-2) \times 180°$

$= 5 \times 180° = 900°$

(ii) When n = 12

$\therefore$ Sum of interior angles = $(n-2) \times 180°$

$= (12-2) \times 180°$

$= 10 \times 180° = 1800°$

(iii) When n = 9

$\therefore$ Sum of interior angles = $(n-2) \times 180°$

$= (9-2) \times 180°$

$= 7 \times 180° = 1260°$

Answer 2.

(i) When n = 6

$\therefore$ Each interior angle of a regular polygon = $\frac{(n-2) \times 180^0}{n}$

$= \frac{(6-2) \times 180^0}{6}$

$= 120°$

(ii) When n = 10

$\therefore$ Each interior angle of a regular polygon = $\frac{(n-2) \times 180^0}{n}$

$= \frac{(10-2) \times 180^0}{10}$

$= 144°$

(iii) When n = 15

$\therefore$ Each interior angle of a regular polygon = $\frac{(n-2) \times 180^0}{n}$

$= \frac{(15-2) \times 180^0}{15}$

$= 156°$

Answer 3.

(i) When n = 9

$\therefore$ Each exterior angle of a regular polygon = $\frac{360^o}{n} = \frac{360^o}{9} = 40^o$

(ii) When n = 15

$\therefore$ Each exterior angle of a regular polygon = $\frac{360^o}{n} = \frac{360^o}{15} = 24^o$

(iii) When n = 18

$\therefore$ Each exterior angle of a regular polygon = $\frac{360^o}{n} = \frac{360^o}{18} = 20^o$

Answer 4.

(i) Each interior angle of a regular polygon = $\frac{(n-2) \times 180^o}{n}$

$\Rightarrow \frac{(n-2) \times 180^o}{n} = 120^\circ$

$\Rightarrow 180^\circ (n-2) = 120^\circ (n)$

$\Rightarrow 3(n-2) = 2n$

$\Rightarrow n = 6$

(ii) Each interior angle of a regular polygon = $\frac{(n-2) \times 180^o}{n}$

$\Rightarrow \frac{(n-2) \times 180^o}{n} = 140^\circ$

$\Rightarrow 180^\circ (n-2) = 140^\circ (n)$

$\Rightarrow 9(n-2) = 7n$

$\Rightarrow n = \frac{18}{2} = 9$

(iii) Each interior angle of a regular polygon = $\frac{(n-2) \times 180^o}{n}$

$\Rightarrow \frac{(n-2) \times 180^o}{n} = 135^\circ$

$\Rightarrow 180^\circ (n-2) = 135^\circ (n)$

$\Rightarrow 4(n-2) = 3n$

$\Rightarrow n = 8$

Answer 5.

(i) Each exterior angle = $\frac{360^\circ}{n}$

$\Rightarrow \quad \frac{360^\circ}{n} = 20^\circ$

$\Rightarrow \quad n = 18$

(ii) Each exterior angle = $\frac{360^\circ}{n}$

$\Rightarrow \quad \frac{360^\circ}{n} = 60^\circ$

$\Rightarrow \quad n = 6$

(iii) Each exterior angle = $\frac{360^\circ}{n}$

$\Rightarrow \quad \frac{360^\circ}{n} = 72^\circ$

$\Rightarrow \quad n = 5$

Answer 6.

A pentagon has 5 sides

$\therefore$ Sum of interior angles = $(n-2) \times 180^\circ$

$= (5-2) \times 180^\circ$

$= 3 \times 180^\circ = 540^\circ$

Given , the angles are $100^\circ, 96^\circ, 74^\circ, 2x^\circ$ and $3x^\circ$

$\therefore \; 100^\circ + 96^\circ + 74^\circ + 2x^\circ + 3x^\circ = 540^\circ$

$\Rightarrow \quad 5x^\circ + 270^\circ = 540^\circ$

$\Rightarrow \quad x^\circ = \frac{(540^\circ - 270^\circ)}{5} = 54^\circ$

$\therefore$ The two angles $2x^\circ$ and $3x^\circ$ are 108° and 162° respectively.

Answer 7.

A quadrilateral is a polygon with four sides

$\therefore$ Sum of interior angles = $(n-2) \times 180°$

$= (4-2) \times 180°$

$= 2 \times 180° = 360°$

Given, the three interior angles are 71°, 110°, 95°

Let the fourth angle be x

$\therefore$ $71° + 110° + 95° + x = 360°$

$\Rightarrow$ $x + 276° = 360°$

$\Rightarrow$ $x = 360° - 276° = 84°$

$\therefore$ The fourth angle is 84°.

Answer 8.

A pentagon has 5 sides

$\therefore$ Sum of interior angles = $(n-2) \times 180°$

$= (5-2) \times 180°$

$= 3 \times 180° = 540°$

Ratio of the angles = 4:4:6:7:6

$\therefore$ The interior angles are 4x°, 4x°, 6x°, 7x° and 6x°.

$\therefore$ $4x° + 4x° + 6x° + 7x° + 6x° = 540°$

$\Rightarrow$ $27x° = 540°$

$\Rightarrow$ $x° = 20°$

$\therefore$ The interior angles of the pentagon are 80°, 80°, 120°, 140° and 120°.

Answer 9.

A quadrilateral is a polygon with four sides

$\therefore$ Sum of interior angles = $(n-2) \times 180°$

$= (4-2) \times 180°$

$= 2 \times 180° = 360°$

Ratio of the angles = 1:4:5:2

$\therefore$ The interior angles are $x°$, $4x°$, $5x°$ and $2x°$.

$\therefore$ $x° + 4x° + 5x° + 2x° = 360°$

$\Rightarrow$ $12x° = 360°$

$\Rightarrow$ $x° = 30°$

$\therefore$ The interior angles of the quadrilateral are 30°, 120°, 150° and 60°.

Answer 10.

A pentagon has 5 sides

$\therefore$ Sum of interior angles = $(n-2) \times 180°$

$= (5-2) \times 180°$

$= 3 \times 180° = 540°$

Given, the angles are $x°$, $(x-10)°$, $(x+20)°$, $(2x-44)°$ and $(2x-70)°$

$\therefore$ $x° + (x-10)° + (x+20)° + (2x-44)° + (2x-70)° = 540°$

$\Rightarrow$ $7x° - 104° = 540°$

$\Rightarrow$ $x° = \dfrac{(540° + 104°)}{7} = 92°$

$\therefore$ The interior angles of the pentagon are 92°, 82°, 112°, 140° and 114°.

Answer 11.

A hexagon has 6 sides

$\therefore$ Sum of interior angles = $(n-2) \times 180°$

$= (6-2) \times 180°$

$= 4 \times 180° = 720°$

Given, the angles of a hexagon are $(2x+5)°$, $(3x-5)°$, $(x+40)°$, $(2x+20)°$, $(2x+25)°$ and $(2x+35)°$

$\therefore$ $(2x+5)° + (3x-5)° + (x+40)° + (2x+20)° + (2x+25)° + (2x+35)° = 720°$

$\Rightarrow$ $12x + 120° = 720°$

$\Rightarrow$ $x = 50°$

Answer 12.

A hexagon has 6 sides

∴ Sum of interior angles = $(n-2) \times 180^\circ$

$= (6-2) \times 180^\circ$

$= 4 \times 180^\circ = 720^\circ$

One angle is given to be 140°

Ratio of the remaining five angles = 4:3:4:5:4

∴ The interior angles are $4x^\circ$, $3x^\circ$, $4x^\circ$, $5x^\circ$ and $4x^\circ$

∴ $140^\circ + 4x^\circ + 3x^\circ + 4x^\circ + 5x^\circ + 4x^\circ = 720^\circ$

$\Rightarrow 20x^\circ + 140^\circ = 720^\circ$

$\Rightarrow x^\circ = 580^\circ / 20 = 29^\circ$

∴ The smallest angle is $3x^\circ = 3.\ 29^\circ = 87^\circ$

∴ The largest angle is $5x^\circ = 5.\ 29^\circ = 145^\circ$

Answer 13.

A pentagon has 5 sides

∴ Sum of interior angles = $(n-2) \times 180^\circ$

$= (5-2) \times 180^\circ$

$= 3 \times 180^\circ = 540^\circ$

One angle is given to be 160°

Ratio of the remaining four angles = 1:1:1:1

∴ The interior angles are x°, x°, x° and x°

∴ $160^\circ + x^\circ + x^\circ + x^\circ + x^\circ = 540^\circ$

$\Rightarrow 4x^\circ = 540^\circ - 160^\circ = 380^\circ$

$\Rightarrow x^\circ = 95^\circ$

∴ Each equal angle is 95°.

Answer 14.

A nonagon has 9 sides.

∴ Each interior angle of a regular polygon = $\dfrac{(n-2) \times 180^\circ}{n}$

$= \dfrac{(9-2) \times 180^\circ}{9}$

$= 140^\circ$

Answer 15.

Here n = 20

$\therefore$ Each interior angle of the regular polygon = $\dfrac{(n-2) \times 180^\circ}{n}$

$= \dfrac{(20-2) \times 180^\circ}{20}$

$= 162^\circ$

Answer 16A.

Let the number of sides in the polygon be n.

$\therefore (n-2) \times 180^\circ = 780^\circ$

$\Rightarrow 180^\circ n - 360^\circ = 780^\circ$

$\Rightarrow 180^\circ n = 1140^\circ$

$\Rightarrow n = \dfrac{1140^\circ}{180^\circ} = 6\dfrac{1}{3}$

Since the number of sides of a polygon cannot be in a fraction, therefore the polygon is not possible.

Answer 16B.

Let the number of sides in the polygon be n.

$\therefore (n-2) \times 180^\circ = 7$ Right Angles

$\Rightarrow (n-2) \times 180^\circ = 7 \times 90^\circ$

$\Rightarrow 180^\circ n - 360^\circ = 630^\circ$

$\Rightarrow 180^\circ n = 990^\circ$

$\Rightarrow n = \dfrac{990^\circ}{180^\circ} = \dfrac{11}{2} = 5\dfrac{1}{2}$

Since the number of sides of a polygon cannot be in a fraction, therefore the polygon is not possible.

Answer 17A.

Given each interior angle = 124°

So, each exterior angle = $180^\circ - 124^\circ = 56^\circ$

Thus, the number of sides of the polygon

$= \dfrac{360^\circ}{\text{Each exterior angle}}$

$= \dfrac{360^\circ}{56^\circ}$

$= 6\dfrac{3}{7}$, which is not a natural number

Therefore, no polygon is possible whose each interior angle is 124°.

Answer 17B.

Given each interior angle = 105°

So, each exterior angle = 180° – 105° = 75°

Thus, the number of sides of the polygon

$= \dfrac{360°}{\text{Each exterior angle}}$

$= \dfrac{360°}{75°}$

$= 4\dfrac{4}{5}$, which is not a natural number

Therefore, no polygon is possible whose each interior angle is 105°.

Answer 18.

The sum of the interior angles of heptagon

= (n – 2) x 180°

= (7 – 2) x 180°

= 5 x 180°

= 900°

Since, three angles are equal to 120°,

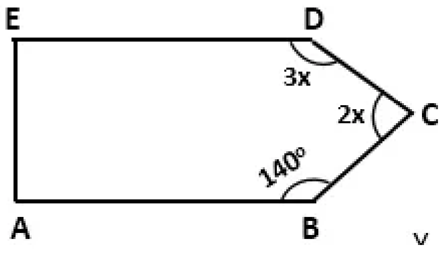
∴ The sum of remaining four angles = 900° – 3 x 120° = 900° – 360° = 540°

Since, these angles are equal,

∴ The measure of each equal angle $= \dfrac{540°}{4} = 135°$

Thus, the angles of heptagon are 120°, 120°, 120°, 135°, 135°, 135°, 135°.

Answer 19.



Since, AB || ED, we have

∠A + ∠E = 180°

Now, ∠A + ∠B + ∠C + ∠D + ∠E = (5 – 2) x 180°

⇒ (∠A + ∠E) + 140° + 2x + 3x = 3 x 180°

⇒ 180° + 140° + 5x = 540°

⇒ 320° + 5x = 540°

⇒ 5x = 220°

⇒ x = 44°

Hence,

∠C = 2x = 2 x 44° = 88°

∠D = 3x = 3 x 44° = 132°

Answer 20.

Let the number of sides of the polygon be n

Number of right angles = 3

$\therefore$ Number of angles of 165° each = $n - 3$

Sum of interior angles of a polygon = $(n - 2) \times 180^\circ$

$\Rightarrow 3 \times 90^\circ + (n - 3)165^\circ = 180^\circ n - 360^\circ$

$\Rightarrow 270^\circ + 165^\circ n - 495^\circ = 180^\circ n - 360^\circ$

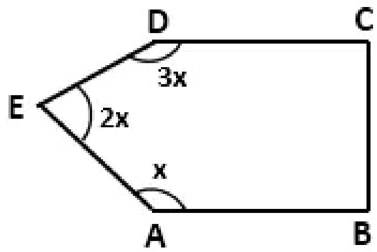
$\Rightarrow 180^\circ n - 165^\circ k = 270^\circ - 495^\circ + 360^\circ$

$\Rightarrow 15^\circ n = 135^\circ$

$\Rightarrow n = 9$

Thus, the number of sides in the polygon is 9.

Answer 21.



Given AB || DC

$\Rightarrow \angle B + \angle C = 180^\circ$

Also, $\angle A : \angle E : \angle D = 1 : 2 : 3$

$\Rightarrow \angle A = x$, $\angle E = 2x$ and $\angle D = 3x$

Since, $\angle A + \angle B + \angle C + \angle D + \angle E = (5 - 2) \times 180^\circ$

$\Rightarrow \angle A + (\angle B + \angle C) + \angle D + \angle E = 3 \times 180^\circ$

$\Rightarrow x + 180^\circ + 3x + 2x = 540^\circ$

$\Rightarrow 6x + 180^\circ = 540^\circ$

$\Rightarrow 6x = 360^\circ$

$\Rightarrow x = 60^\circ$

Hence, $\angle A = 60^\circ$

Answer 22.

Each exterior angle of a regular polygon of n sides = $\frac{360°}{n}$

$\therefore$ Each exterior angle of a regular polygon of (n + 1) sides = $\frac{360°}{n+1}$

Difference between the two exterior angles = 4°

$\Rightarrow \frac{360°}{n} - \frac{360°}{n+1} = 4°$

$\Rightarrow \frac{90}{n} - \frac{90}{n+1} = 1$

$\Rightarrow \frac{90n + 90 - 90n}{n(n+1)} = 1$

$\Rightarrow 90 = n^2 + n$

$\Rightarrow n^2 + n - 90 = 0$

$\Rightarrow n^2 + 10n - 9n - 90 = 0$

$\Rightarrow n(n+10) - 9(n+10) = 0$

$\Rightarrow (n+10)(n-9) = 0$

$\Rightarrow n + 10 = 0 \text{ or } n - 9 = 0$

$\Rightarrow n = -10 \text{ or } n = 9$

Since the number of sides cannot be negative, we have n = 9.

Answer 23.

Ratio of the sides = 2 : 3.

$\therefore$ Number of sides in each polygon is 2x and 3x.

Interior angle of a regular polygon of n sides = $\frac{(n-2) \times 180°}{n}$

$\therefore$ Interior angle of a regular polygon of 2x sides = $\frac{(2x-2) \times 180°}{2x}$

And, interior angle of a regular polygon of 3x sides = $\frac{(3x-2) \times 180°}{3x}$

Ratio of the interior angles = 9 : 10

$\Rightarrow \frac{(2x-2) \times 180°}{2x} : \frac{(3x-2) \times 180°}{3x} = 9 : 10$

$\Rightarrow \frac{(2x-2) \times 180°}{2x} \times \frac{3x}{(3x-2) \times 180°} = \frac{9}{10}$

$\Rightarrow \frac{(x-1) \times 180°}{x} \times \frac{3x}{(3x-2) \times 180°} = \frac{9}{10}$

$\Rightarrow \frac{3(x-1)}{(3x-2)} = \frac{9}{10}$

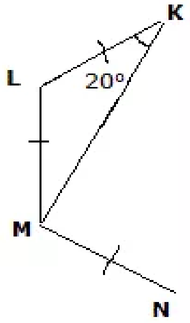
$\Rightarrow \frac{x-1}{3x-2} = \frac{3}{10}$

$\Rightarrow 10x - 10 = 9x - 6$

$\Rightarrow x = 4$

$\therefore$ Number of sides in each polygon = 2(4) = 8 and 3(4) = 12.

Answer 24.



In $\triangle LMK$, LM = LK [Sides of a regular polygon]

$\therefore$ $\angle LMK = \angle LKM = 20°$ [Angles opp to equal sides are equal]

$\therefore$ $\angle LKM + \angle LMK + \angle KLM = 180°$

$\Rightarrow$ $20° + 20° + \angle KLM = 180°$

$\Rightarrow$ $\angle KLM = 140°$

$\therefore$ Each interior angle of the polygon is 140°.

Each interior angle of a regular polygon = $\dfrac{(n-2) \times 180^o}{n}$

$\Rightarrow$ $\dfrac{(n-2) \times 180^o}{n} = 140°$

$\Rightarrow$ $180°(n-2) = 140° n$

$\Rightarrow$ $40° n = 360°$

$\therefore$ $n = 9$

$\therefore$ Number of sides of the polygon = 9

Answer 25.

Ratio of the sides is 3:4

$\therefore$ Number of sides in each polygon is 3x and 4x.

Each interior angle of a regular polygon = $\dfrac{(n-2) \times 180^o}{n}$

$\therefore$ Interior angle of a regular polygon of 3x sides = $\dfrac{(3x-2) \times 180^o}{3x}$

And Interior angle of a regular polygon of 4x sides = $\dfrac{(4x-2) \times 180^o}{4x}$

Ratio of the interior angles is 2:3

$$\Rightarrow \left\{\frac{(3x-2) \times 180^o}{3x}\right\} : \left\{\frac{(4x-2) \times 180^o}{4x}\right\} = 2 : 3$$

$$\Rightarrow \left\{\frac{(3x-2) \times 180^o}{3x}\right\} \times \left\{\frac{4x}{(4x-2) \times 180^o}\right\} = \frac{2}{3}$$

$\Rightarrow \quad \frac{(3x-2)}{(4x-2)} \times \frac{4}{3} = \frac{2}{3}$

$\Rightarrow \quad 2(3x-2) = (4x-2)$

$\Rightarrow \quad 2x = 2$

$\therefore \quad x = 1$

So, the number of sides of each of the polygons are 3 and 4.

Answer 26.

A heptagon has 7 sides.

$\therefore$ Sum of interior angles = $(n-2) \times 180°$

$= (7-2) \times 180°$

$= 5 \times 180° = 900°$

Given, four of its angles are equal

Let the equal angles be x° each.

$\therefore \quad 132°+132°+132°+x+x+x+x=900°$

$\Rightarrow \quad 4x + 396° = 900°$

$\Rightarrow \quad 4x = 504°$

$\Rightarrow \quad x = 126°$

$\therefore$ Measure of each equal angle is 126°.

Answer 27.

An octagon has 8 sides.

$\therefore$ Sum of interior angles = $(n-2) \times 180°$

$= (8-2) \times 180°$

$= 6 \times 180° = 1080°$

Given, six of its angles are equal.

Let the equal angles be x° each.

$\therefore \quad 148° + 152° + x + x + x + x + x + x = 1080°$

$\Rightarrow \quad 6x + 300° = 1080°$

$\Rightarrow \quad 6x = 780°$

$\Rightarrow \quad x = 130°$

Each of the equal angles are equal to 130°.

Answer 28.

An octagon has 8 sides, hence eight angles.

Sum of interior angles = $(n-2) \times 180°$

$= (8-2) \times 180°$

$= 6 \times 180° = 1080°$

Given, four of its angles are equal.
Let each of the equal angles be $x°$

$\therefore$ Other four angles are = $(x + 20)°$

$\therefore$ $x° + x° + x° + x° + (x+20)° + (x+20)° + (x+20)° + (x+20)° = 1080°$

$\Rightarrow$ $8x° + 80° = 1080°$

$\Rightarrow$ $8x° = 1000°$

$\therefore$ $x° = 125°$

$\therefore$ The four equal angles are 125°
The other four angles are = 125° + 20° = 145°.

Answer 29.

Let the interior angle be x

Then, the exterior angle is $\frac{x}{3}$

$\therefore$ $x + \frac{x}{3} = 180°$

[Interior angle and exterior angle form a linear pair]

$\Rightarrow$ $\frac{4x}{3} = 180°$

$\Rightarrow$ $x = \frac{3}{4} \times 180° = 135°$

$\therefore$ Exterior angle = $\frac{135°}{3} = 45°$

Each exterior angle = $\frac{360°}{n}$

$\Rightarrow$ $\frac{360°}{n} = 45°$

$\Rightarrow$ $n = 8$

$\therefore$ The regular polygon has 8 sides.

Answer 30.

Let the exterior angle be x

Then, the interior angle is 2x

∴ $x + 2x = 180°$

[Interior angle and exterior angle form a linear pair]

⇒ $3x = 180°$

⇒ $x = \frac{180^o}{3} = 60^o$

∴ Exterior angle = 60°

Each exterior angle = $\frac{360^o}{n}$

⇒ $\frac{360^o}{n} = 60°$

⇒ $n = 6$

∴ The regular polygon has 6 sides.

Answer 31.

Sum of the interior angles of a polygon = (n-2) x 180°

Sum of the exterior angles of a polygon = 360°

Given, Sum of the interior angles of a polygon = 6.5(Sum of the exterior angles of a polygon)

∴ $(n-2) \times 180° = 6.5 \times 360°$

⇒ $n - 2 = 13$

⇒ $n = 15$

∴ The polygon has 15 sides.

Answer 32.

Each exterior angle of a regular polygon of n sides = $\frac{360^o}{n}$

$\therefore$ Each exterior angle of a regular polygon of (n-1) sides = $\frac{360^o}{n-1}$

$\therefore$ Each exterior angle of a regular polygon of (n+2) sides = $\frac{360^o}{n+2}$

Difference between the two exterior angles = 6°

$\therefore \quad \frac{360^o}{n-1} - \frac{360^o}{n+2} = 6°$

$\Rightarrow \quad 360^o\left[\frac{n+2-n+1}{(n-1)(n+2)}\right] = 6°$

$\Rightarrow \quad 60 \times 3 = (n-1)(n+2)$

$\Rightarrow \quad 180 = n^2 + n - 2$

$\Rightarrow \quad n^2 + n - 182 = 0$

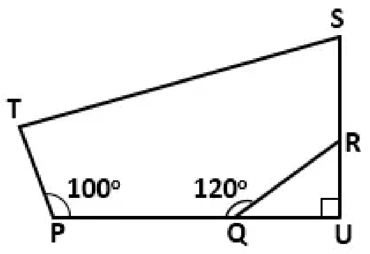
$\Rightarrow \quad n^2 + 14n - 13n - 182 = 0$

$\Rightarrow \quad (n+14)(n-13) = 0$

$\therefore$ n = -14 (rejected as number of sides can't be negative) or n = 13

$\therefore$ The value of n is 13.

Answer 33.



In the figure, PQ and SR produced meet at point P,

$\therefore \angle U = 90^o$

$\angle Q = 120^o$

$\Rightarrow \angle UQR = 180^o - 120^o = 60^o$

$\therefore \angle URQ = 90^o - \angle UQR = 90^o - 60^o = 30^o$

$\therefore QRS = 180^o - \angle URQ = 180^o - 30^o = 150^o$

Let $\angle S = \angle T = x$

Since, $\angle P + \angle Q + \angle QRS + \angle S + \angle T = (5-2) \times 180^o$

$\Rightarrow 100^o + 120^o + 150^o + x + x = 3 \times 180^o$

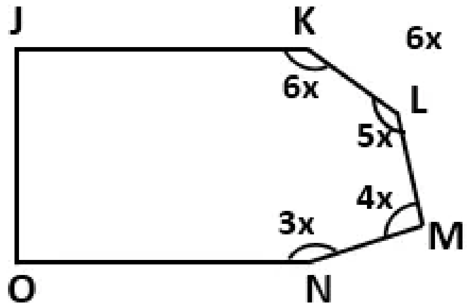
$\Rightarrow 370^o + 2x = 540^o$

$\Rightarrow 2x = 170^o$

$\Rightarrow x = 85^o$

Hence, $\angle PTS = 85^o$

Answer 34.



Given JK || ON

$\Rightarrow \angle J + \angle O = 180^\circ$

Also, $\angle K : \angle L : \angle M : \angle N = 6 : 5 : 4 : 3$

$\Rightarrow \angle K = 6x,\ \angle L = 5x,\ \angle M = 4x$ and $\angle N = 3x$

Since, $\angle J + \angle K + \angle L + \angle M + \angle N + \angle O = (6 - 2) \times 180^\circ$

$\Rightarrow (\angle J + \angle O) + \angle K + \angle L + \angle M + \angle N = 4 \times 180^\circ$

$\Rightarrow 180^\circ + 6x + 5x + 4x + 3x = 720^\circ$

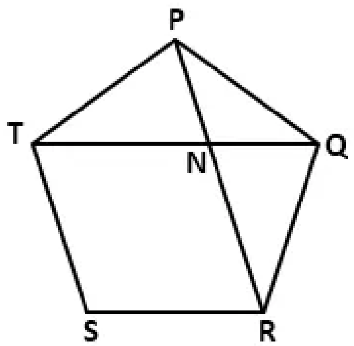
$\Rightarrow 18x + 180^\circ = 720^\circ$

$\Rightarrow 18x = 540^\circ$

$\Rightarrow x = 30^\circ$

Hence, $\angle K = 6x = 6 \times 30^\circ = 180^\circ$ and $\angle M = 4x = 4 \times 30^\circ = 120^\circ$

Answer 35.



Each interior angle of a regular pentagon $= \dfrac{(5 - 2) \times 180^\circ}{5} = 3 \times 36^\circ = 108^\circ$

Now, in ΔPQT,

PT = PQ ....(sides of a regular pentagon)

$\Rightarrow \angle PQT = \angle PTQ = x$ (say)

Now, $\angle PQT + \angle PTQ + \angle QPT = 180^\circ$

$\Rightarrow x + x + 108^\circ = 180^\circ$

$\Rightarrow 2x = 72^\circ$

$\Rightarrow x = 36^\circ$

$\Rightarrow \angle PQT = \angle PTQ = 36^\circ$

Similarly, we can rove that in ΔPQR,

$\angle QPR = \angle QRP = 36^\circ$

Now, $\angle RQT = \angle RQP - \angle PQT$

$= 108^\circ - 36^\circ$

$= 72^\circ$

In ΔQNP,

$\angle PQN + \angle QPN + \angle QNP = 180^\circ$

$\Rightarrow 36^\circ + 36^\circ + \angle QNP = 180^\circ$

$\Rightarrow \angle QNP = 180^\circ - 72^\circ$

$\Rightarrow \angle QNP = 108^\circ$

Answer 36.

Each interior angle of a regular polygon of n sides = $\frac{(n-2) \times 180^\circ}{n}$

Each exterior angle of a regular polygon of n sides = $\frac{360^\circ}{n}$

Now,

$\frac{360^\circ}{n} = \frac{1}{p} \times \frac{(n-2) \times 180^\circ}{n}$

$\Rightarrow 360^\circ = \frac{1}{p} \times (n-2) \times 180^\circ$

$\Rightarrow n - 2 = p \times \frac{360^\circ}{180^\circ}$

$\Rightarrow n - 2 = 2p$

$\Rightarrow n = 2p + 2$

$\Rightarrow n = 2(p+1)$

Thus, the number of sides of a given regular polygon is $2(p+1)$.

Answer 37.

For the given polygon:

Each interior angle = 162°

$\Rightarrow$ Each exterior angle = $180^\circ - 162^\circ = 18^\circ$

$\therefore$ Number of sides in it = $\frac{360^\circ}{18^\circ} = 20$

For the other polygon:

Number of sides = $2 \times 20 = 40$

$\therefore$ Each exterior angle = $\frac{360^\circ}{40} = 9^\circ$

And, each interior angle = $180^\circ - 9^\circ = 171^\circ$